

Molarity $M = \frac{n}{V}$

What is the molarity of a solution that contains 126 g of NaCl dissolved in 250 mL of solution?

$$126 \text{ g NaCl} \left(\frac{1 \text{ mol}}{58.5 \text{ g}} \right) \left(\frac{1}{0.250 \text{ L}} \right) = \boxed{8.6 \text{ M}}$$

What is the volume of a solution of 3M HCl that was made with 57.8g HCl?

$$V = \frac{n}{M} \quad 57.8 \text{ g HCl} \left(\frac{1 \text{ mol}}{36.5 \text{ g}} \right) \left(\frac{1 \text{ L}}{3 \text{ mol}} \right) = \boxed{0.5 \text{ L}}$$

How many grams of CaCl_2 are required to make 100mL of a 0.5M solution of CaCl_2 ?

$$n = VM \quad (0.1 \text{ L}) \left(\frac{0.5 \text{ mol}}{1 \text{ L}} \right) \left(\frac{111.1}{1 \text{ mol CaCl}_2} \right) = \boxed{5 \text{ g CaCl}_2}$$

Dilutions $M_1 V_1 = M_2 V_2$

If enough water is added to a 100ml of a 4.5M solution NaOH so that the final volume of the solution is 500 mL, what is the molarity of the new solution.

$$\frac{M_1 V_1}{V_2} = M_2 \quad \frac{100 \text{ mL} \cdot 4.5 \text{ M}}{500 \text{ mL}} = \boxed{0.9 \text{ M}}$$

How much water would have to be added to 250mL of a 6M solution of LiCl to adjust the molarity to 2.5M?

$$\frac{(250 \text{ mL})(6 \text{ M})}{(2.5 \text{ M})} = 600 \text{ mL} \quad 600 - 250 = \boxed{350 \text{ mL}}$$

pH $\text{pH} = -\log[\text{H}^+]$ $K_w = [\text{H}^+][\text{OH}^-] = 1 \times 10^{-14} \text{ M}$ What is the pH of a solution that has a $[\text{OH}^-]$ concentration of 1×10^{-10} ? Is this solution acidic or basic?

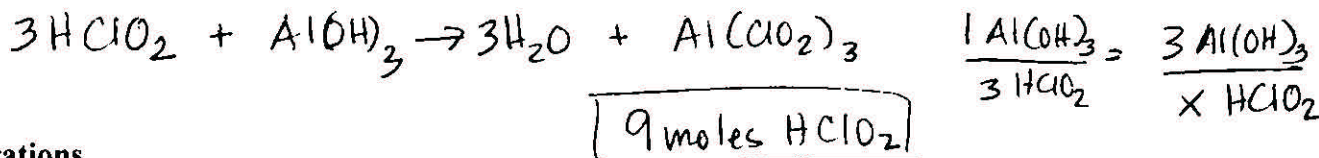
$$\frac{1 \times 10^{-14}}{1 \times 10^{-10}} = [\text{H}^+] = 1 \times 10^{-4} \quad -\log(1 \times 10^{-4}) = 4 \quad \text{Acidic}$$

What is the pOH of a solution that has a $[\text{H}^+]$ concentration of 1×10^{-4} ?

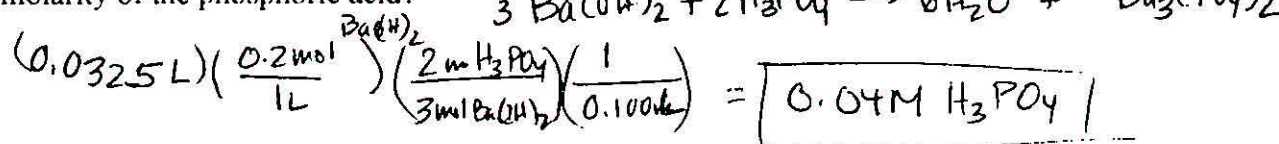
$$\frac{1 \times 10^{-14}}{1 \times 10^{-4}} = [\text{OH}^-] = 1 \times 10^{-10} \quad -\log(1 \times 10^{-10}) = \boxed{\text{pOH} = 10}$$

Neutralization

How many moles of chlorous acid could be neutralized by 3 moles of aluminum hydroxide?

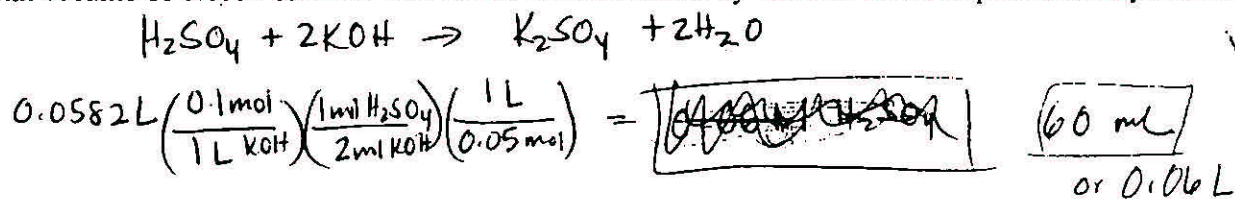
**Titration**

32.5 ml of 0.2M barium hydroxide is required to neutralize 100mL of phosphoric acid. What is the molarity of the phosphoric acid?



What volume of 0.05M sulfuric acid would be neutralized by 58.2mL of 0.1M potassium hydroxide?

$$V = \frac{n}{M}$$



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